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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,177	09/27/2004	Akinori Koukitsu	121213	5228

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EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/509,177	Applicant(s) KOUKITSU ET AL.	
	Examiner Matthew J. Song	Art Unit 1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>8/15/06; 4/18/06; 3/3/06. 6/2/05; 9/21/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 7-11 and 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibata et al (EP 1184488 A2) from IDS.

Shibata et al discloses an apparatus for hydride vapor phase epitaxy including a first zone **25** heated by heaters **23** and a second zone **26** heated by heaters **24** (Abstract, Fig 1; [0028]-[0038]). Shibata et al also discloses the first zone is heated to up to 900 °C and the second zone is heated up to 1000 °C ([0038])

Referring to the limitation requiring the temperature of the first zone is maintained at 700 °C or below and the second zone is maintained at a temperature of 700-1300 °C, this limitation is viewed as intended use and a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The apparatus taught by Shibata et al is capable of performing the claimed intended use because Shibata et al discloses two heaters for maintaining two zones of temperature in a HVPE apparatus.

Referring to claims 8, 14, and 15, Shibata et al discloses a boat **17** for holding a metallic material ([0030] and Fig 1). The boat taught by Shibata is capable of holding a solid mixture of

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Al. Shibata et al also discloses a gas supplying means for supplying HCl, hydrogen and ammonia; a susceptor 13 for holding a substrate 12.

Referring to claim 9, the limitation merely further limits the apparatus by claiming an intended use. a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The apparatus taught by Shibata et al is capable of performing the claimed intended use.

Referring to claim 10, Shibata et al discloses the reactor is made of quartz ([0040]), a first heating means 23, a second heating means 24. The limitation of producing a halogenated produced in a first reaction zone is carried by the flow of the gas introduced into the first reaction zone to the second reaction zone, is viewed an intended use limitation. Shibata et al is capable of performing the claimed intended use, thus meets the claimed limitation.

Referring to claim 11, 16, 17, Shibata et al discloses supplying HCl and H₂. The supplying of particular gases is merely intended use. Shibata et al gas supplying mechanism is capable of supplying any gas, thus meets the limitation.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nikolaev et al (US 6,218,269).

In a method of forming III-V compounds, note entire reference, Nikolaev et al teaches reacting Al metal with HCl at a temperature of 350-800 °C, this clearly suggests applicant's solid Al because Al metal is solid at temperature below 660 °C, to produce a halogenated product of Al, aluminum trichloride (col 7, ln 50 to col 8, ln 20). Overlapping ranges are held to be prima facie obvious (MPEP 2144.05). Nikolaev et al also teaches forming a III-V compound by reacting aluminum trichloride with ammonia to form AlGaN (col 8, ln 1-25).

Referring to claim 3, Nikolaev et al teaches HCl.

5. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nikolaev et al (US 6,218,269) as applied to claims 1 and 3 above, and further in view of Shibata et al (EP 184488 A2) and Vaudo et al (US 6,533,874).

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Nikolaev et al teaches all of the limitations of claim 4, as discussed previously, except at least one of the amount of the halogenated hydrogen used; the amount of a carrier gas for the halogenated hydrogen; and the amount of the group V element containing gas is varied to deposit a III-V group compound semiconductors having different composition. Nikolaev et al teaches AlGaIn layers forming pn junctions may have different AlN concentrations for different layers (col 7, ln 10-45).

In a method of HVPE, note entire reference, Shibata et al teaches HCl is introduced with H₂ carrier gas and reacted with metallic aluminum to form AlCl₃ gas ([0034]).

It would have been obvious to a person of ordinary skill in the art at the time invention Nikolaev et al by using a carrier gas for HCl, as taught by Shibata et al, because carrier gases are known in the art to provide a smooth of reaction gases into the deposition chamber, as evidenced by Kang et al (US 6,197,683) in column 6, lines 15-25.

The combination of Nikolaev et al and Shibata et al does not teach the amount of a carrier gas for the halogenated hydrogen is varied to deposit a III-V group compound semiconductors having different composition.

In a method of HVPE, note entire reference, Vaudo et al teaches the composition of (Ga,Al,In)N is controlled by the flow of HCl over each metal as well as by the substrate temperature and by the temperature of each metal (col 11, ln 10-60), this clearly suggests varying the amount and the amount of carrier gas for the halogenated hydrogen gas because the flow of HCl is dependant on the flow carrier gas.

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It would have been obvious to a person of ordinary skill in the art at the time invention to modify Nikolaev et al by varying the HCl amount or amount of carrier gas, as suggested by Vaudo et al, to produce useful graded layers or pn junctions.

Referring to claim 6, the combination of Nikolaev et al, Shibata et al, and Vaudo et al teach HCl and H₂ ('488 Fig 4).

6. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nikolaev et al (US 6,218,269) as applied to claims 1 and 3 above, and further in view of Solomon et al (WO 00/68470 A1) from IDS.

Nikolaev et al teaches all of the limitations of claim 2, as discussed previously, except reacting a solid mixture of group III metals including Al.

In a HVPE method, note entire reference, Solomon et al teaches reacting a group III metal with HCl, where the Group III metal is Ga, In, or Al or alloys thereof (pg 11, ln 1-25).

It would have been obvious to a person of ordinary skill in the art at the time invention to modify Nikolaev et al by using a mixture of Group III metals, which include Al, as taught by Solomon et al because a combination of known material suitable of its intended purpose is held to be obvious (MPEP 2144.07) and because an alloy of Group III metals can produce a ternary compound with a single source.

Referring to claim 12, Nikolaev et al teaches HCl.

7. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nikolaev et al (US 6,218,269) and Solomon et al (WO 00/68470 A1) from IDS, as applied to claims 2 and 12

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above, and further in view of Shibata et al (EP 184488 A2) from IDS and Vaudo et al (US 6,533,874).

The combination of Nikolaev et al and Solomon et al teaches all of the limitations of claim 5, as discussed previously, except at least one of the amount of the halogenated hydrogen used; the amount of a carrier gas for the halogenated hydrogen; and the amount of the group V element containing gas is varied to deposit a III-V group compound semiconductors having different composition. Nikolaev et al teaches AlGa_N layers forming pn junctions may have different AlN concentrations for different layers (col 7, ln 10-45).

In a method of HVPE, note entire reference, Shibata et al teaches HCl is introduced with H₂ carrier gas and reacted with metallic aluminum to form AlCl gas ([0034]).

It would have been obvious to a person of ordinary skill in the art at the time invention to modify the combination of Nikolaev et al and Solomon et al by using a carrier gas for HCl, as taught by Shibata et al, because carrier gases are known in the art to provide a smooth of reaction gases into the deposition chamber, as evidenced by Kang et al (US 6,197,683) in column 6, lines 15-25.

The combination of Nikolaev et al, Solomon et al and Shibata et al does not teach the amount of a carrier gas for the halogenated hydrogen is varied to deposit a III-V group compound semiconductors having different composition.

In a method of HVPE, note entire reference, Vaudo et al teaches the composition of (Ga,Al,In)_N is controlled by the flow of HCl over each metal as well as by the substrate temperature and by the temperature of each metal (col 11, ln 10-60), this clearly suggests varying

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the amount and the amount of carrier gas for the halogenated hydrogen gas because the flow of HCl is dependant on the flow carrier gas.

It would have been obvious to a person of ordinary skill in the art at the time invention to modify the combination of Nikolaev et al, Solomon et al and Shibata et al 1 by varying the HCl amount or amount of carrier gas, as suggested by Vaudo et al, to produce useful graded layers or pn junctions.

Referring to claim 13, the combination of Nikolaev et al, Solomon et al, Shibata et al, and Vaudo et al teach HCl and H₂ ('488 Fig 4).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kang et al (US 6,197,683) teaches a source can be mixed with a carrier gas, such as Ar or N₂, to provide a smooth gas flow into the deposition chamber (col 6, ln 15-30).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

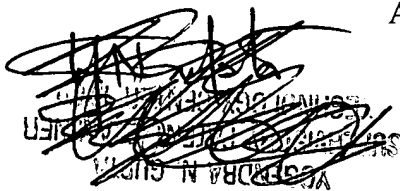
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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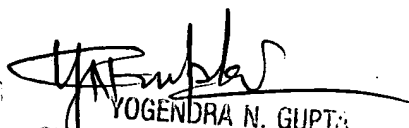
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1722

MJS
November 13, 2006



Handwritten signature of Matthew J Song, Examiner, Art Unit 1722.



Handwritten signature of Yogendra N. Gupta, Supervisory Patent Examiner, Technology Center 1700.

YOGENDRA N. GUPTA
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